Original article:

Evaluation of Risk of Development of Fractures in Diabetes Patients: An Observational Study

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ABSTRACT

Background: The incidence has been found out to be 9 million fractures in the year 2000. Osteoporosis is very common amongst postmenopausal women and hence increasing the lifetime risk of hip, vertebral, and wrist fractures, the risk has been estimated to be around 40%. But there haven’t been much studies to substantiate the use of anti-osteoporotic drugs in subjects with diabetes mellitus to prevent fractures. The present study was conducted with the aim to determine the risk factors for development of fractures amongst diabetic subjects.

Materials and Methods: The present prospective observational study was conducted in the department for a period of 6 months. The study included all the subjects reporting to the department with fractures. The subjects were also asked about history or any other co morbidities like osteoporosis or osteomyelitis. A complete medical evaluation of all the subjects was performed. All the subjects were asked about any smoking or drinking habit. Subjects were also questioned about the drug history. All the data was arranged in a tabulated form and analyzed using SPSS software.

Results: There were 38 diabetic males with fractures and 35 non-diabetic males with fractures. 62 diabetic females had fracture and 65 non-diabetic females had fracture. Diabetic subjects had significant co morbidities compared to non-diabetics. Diabetic subjects had greater percentage of osteoporosis and hence increased chance of fracture. There was no significant effect of alcohol intake and smoking on incidence of fracture amongst diabetics and non-diabetics.

Conclusion: The results of our study clearly indicate that there is a significant association between fracture risk and presence of co morbidities like diabetes, osteoporosis etc.

Keywords: Diabetes, Osteoporosis, Prospective

INTRODUCTION

Osteoporosis is related to significant morbidity and mortality, leading to an increasing risk of fragility fractures amongst subjects. The incidence has been found out to be 9 million fractures in the year 2000. Osteoporosis is very common amongst postmenopausal women and hence increasing the lifetime risk of hip, vertebral, and wrist fractures, the risk has been estimated to be around 40%. As age is an independent risk for osteoporotic fractures, as
the increased life expectancy amongst the developed nations will enhance the magnitude of the problem. Addition to this type 2 diabetes mellitus has reached endemic levels. The recent risk of diabetes mellitus has increased 4 times the past decades ago.\textsuperscript{4} The various complications associated with long-standing diabetes mellitus has contributed to huge impact of the condition. With improvement in medical facilities, the survival of subjects with type I and type II diabetes mellitus has significantly improved and hence the risk of osteoporotic fractures is increasing with age. Both the conditions are imposing a great cost to the health care systems.\textsuperscript{5,6} Various recent studies have shown that the risk of vertebral fractures \textsuperscript{7-9}, hip fractures \textsuperscript{9-13} and non-vertebral fractures \textsuperscript{10,11} increases in subjects with both type I and type 2 diabetes mellitus. The hip and total body bone density is significantly less amongst females with type 1 diabetes mellitus than amongst the controls.\textsuperscript{14} But there haven’t been much studies to substantiate the use of anti-osteoporotic drugs in subjects with diabetes mellitus to prevent fractures. The present study was conducted with the aim to determine the risk factors for development of fractures amongst diabetic subjects.

**MATERIALS AND METHODS**

The present prospective observational study was conducted in the department for a period of 6 months. The study included all the subjects reporting to the department with fractures. All the subjects were informed about the study and a written consent was obtained from all in their vernacular language. All the subjects reporting to the department with fracture were included in the study. Diabetic subjects with history of fractures were questioned about the type and mode of fractures. The demographics of all the subjects like age, gender and socioeconomic status were included in the study. The subjects were also asked about history or any other co-morbidities like osteoporosis or osteomyelitis. A complete medical evaluation of all the subjects was performed. All the subjects were asked about any smoking or drinking habit. Subjects were also questioned about the drug history. All the subjects were educated about the complications of diabetes, both skeletal and neurological. All the data was arranged in a tabulated form and analyzed using SPSS software.

**RESULTS**

Table 1 shows the comparison of demographics and risk of fracture with and without diabetes mellitus. There were 38 diabetic males with fractures and 35 non-diabetic males with fractures. 62 diabetic females had fracture and 65 non-diabetic females had fracture. Amongst the diabetics, there were 24 who were less than 45 years of age, 27 were between 45-59 years and 14 were more than 75 years of age. Amongst the non-diabetics, 23 were less than 45 years of age, 25 were between 45-59 years of age and 19 were more than 75 years of age. There was no significant difference between age and gender distribution amongst both. Diabetic subjects had significant co-morbidities compared to non-diabetics. Diabetic subjects had greater percentage of osteoporosis and hence increased chance of fracture. There were 30 diabetic subjects who smoked and 58 subjects who indulged in alcohol intake. There was no significant effect of alcohol intake and smoking on incidence of fracture amongst diabetics and non-diabetics.

**DISCUSSION**

Diabetes is a widely prevalent disorder, with great morbidity and mortality.\textsuperscript{15} Type 2 diabetes mellitus is a group of metabolic disorder that is characterized by increased blood sugar level due to defects in insulin secretion, production or action.\textsuperscript{15,16} Lack of maintenance of proper glycemic control can lead to the development of complications of diabetes like nephropathy, retinopathy, and neuropathy including various macrovascular diseases like acute coronary
syndrome and stroke.\textsuperscript{15-17} Apart from micro- or macrovascular implications, diabetic patients also suffer from various skeletal disorders, like osteoporosis and fractures.\textsuperscript{18} Diabetes can impact the bone by different mechanisms, some of them may be contradictory in action.\textsuperscript{19} Therefore skeletal integrity and bone turnover are also be affected by diabetes, and bone disease is generally an overlooked complication of diabetes.\textsuperscript{20} It is characterized by microarchitectural changes that reduce the quality of bone and its strength, leading to an increased chances of bone fracture in both types of diabetes cases.\textsuperscript{16} Subjects with type 2 diabetes mellitus present a different skeletal phenotype and impaired geometric properties of bone.\textsuperscript{21} The incidence of osteoporosis increases vividly with age.\textsuperscript{22} In our study, amongst the diabetics, there were 24 who were less than 45 years of age, 27 were between 45-59 years and 14 were more than 75 years of age. Amongst the non-diabetics, 23 were less than 45 years of age, 25 were between 45-59 years of age and 19 were more than 75 years of age. There was no significant difference between age and gender distribution amongst both. Diabetic subjects had significant co morbidities compared to non-diabetics. Diabetic subjects had greater percentage of osteoporosis and hence increased chance of fracture. There were 30 diabetic subjects who smoked and 58 subjects who indulged in alcohol intake. There was no significant effect of alcohol intake and smoking on incidence of fracture amongst diabetics and non-diabetics. Type 2 diabetes mellitus also surges with increasing age, and hence, diabetes and osteoporosis generally coexist in elder adults.\textsuperscript{23} Various authors presented the overview of various factors involved in the risk of osteoporosis and fractures amongst the diabetics.\textsuperscript{15} In diabetic subjects, the bone mineral density ranges between normal to elevated.\textsuperscript{24} For various years, diabetic patients were not regarded to be at risk of osteoporosis, as the reports showed high BMD compared to health adults. However, later during the year studies showed that subjects with type 2 diabetes might have an increased risk for bone fractures, even with higher BMD.\textsuperscript{25,26} The chances of bone fractures in subjects with diabetes may not be related to bone mineral density, and diabetes decreases bone quality rather than density.\textsuperscript{24} The association between diabetes and risk of fracture has shown significant interest in the past years, and different studies have evaluated the risk of fracture amongst subjects with diabetes.\textsuperscript{18-21} The studies have showed different results ranging from positive,\textsuperscript{26,27} null,\textsuperscript{27} and even inverse.\textsuperscript{28,29}

**CONCLUSION**

The results of our study clearly indicate that there is a significant association between fracture risk and presence of co morbidities like diabetes, osteoporosis etc. Increasing age is associated as an independent risk factor fracture and osteoporosis. Due to increased life expectancy, there is increase in the incidence of comorbidities and hence more risk of fractures.

**REFERENCES**


Table 1: Comparison of demographics and risk of fracture with and without diabetes mellitus.

<table>
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<th>Variable</th>
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<th>Non-diabetic subjects (n=100)</th>
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<tr>
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